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The Smart Home Controller on Your Wrist



POLITECNICO
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Background

Ambient Intelligence (Aml) environments, or Smart Homes, are defined as “digital environments that proactively, but sensibly, support people in their daily lives”. Such “sensible and proactive” support is achieved by continuously and unobtrusively complementing human activity. Human-Home interfaces are still under investigation and a suitable tradeoff between traditional (e.g., switches) and PC/mobile interfaces has not yet been found. Traditional interfaces are well understood, easy to use and not intrusive at all, as they are already part of householder’s daily lives. PC/mobile interfaces, instead, are typically intrusive and impose cognitive load (explicit mediator) on the home inhabitants.

Wearable computing aims at overcoming part of these user-home interaction issues, by enhancing the invisibility of Aml systems and by improving the level of acceptance of proposed solutions in accomplishing home tasks. Nowadays, wrist watches or bracelets are among the most attractive solutions.

Requirements

Context
sensors on
board*

Body
sensors on
board

Sound
emitter and
haptics

Localization

Wireless
communica
tion*

Long-
lasting
battery*

Display*

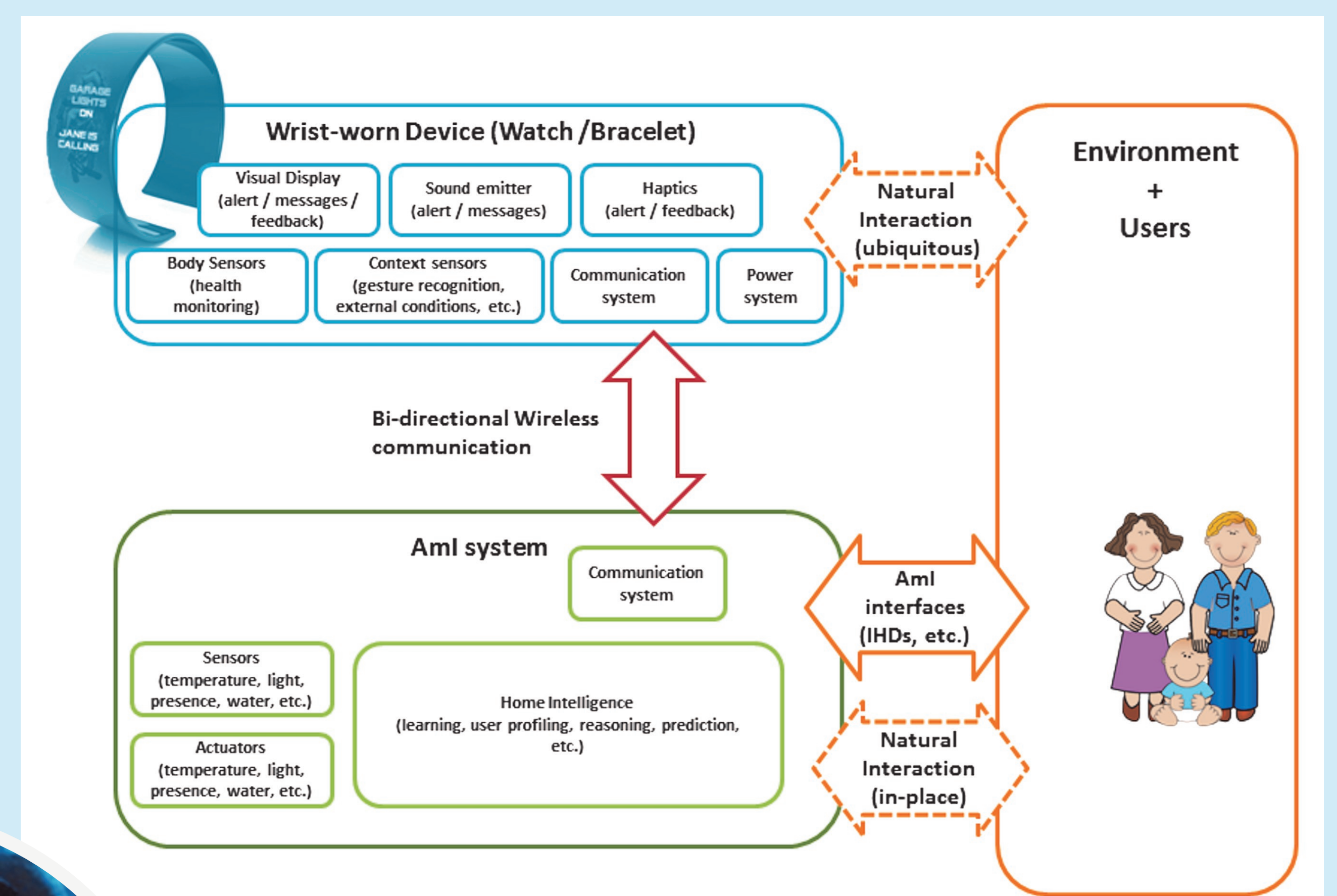
Buttons*

Touch
screen

Aspect
customiza
tion

Function
customiza
tion

Architecture



Implementation

Wrist-worn device: eZ430-Chronos

The eZ430-Chronos is an affordable but complete development system, featuring a 96 segment LCD display, a pressure sensor, a 3-axis accelerometers, a temperature sensor, a sound emitter and 4 buttons. A custom firmware has been implemented to support new functionalities: quick access commands, silent and loud messages, reply messages and automatic accelerometer data communication.

Aml system: Dog

Dog (Domotic OSGi Gateway) is a software-based home gateway with high level semantic device modeling and a driver architecture that allows to support different home automation technologies. A driver for the eZ430-Chronos has been added to support the watch features (original and implemented) and to implement the server side of the wireless communication.



Results

Test

A preliminary user test has been carried with the goal to evaluate the watch functions and the possible adoption scenarios. We recruited 4 participants, 2 females and 2 males (aged between 35-46): only one works in the computer science field and all of them habitually wear a wrist watch. During the evaluation, Dog sent to the watch two different messages: a request to turn off a lamp and a warning message.

Outcomes

Participants **would use** such a system both in their homes and workplaces; they found the watch menus easy to navigate and to use, but only after an initial explanation. They were **interested in controlling their home appliances** with the watch but would spend **20-40 euros** to buy a watch with such features. Final grade given to the watch: **3.5** (out of 5)